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Writing out the determinant we get $(3\sqrt{2} \tan 70^\circ - 2)y = (\sqrt{6} \tan 70^\circ + 2)z$.

$$\therefore \theta = \angle HZN = \tan^{-1} \left\{ \frac{3\sqrt{2} \tan 70^\circ - 2}{\sqrt{6} \tan 70^\circ + 2} \right\} = 47^\circ 53' 6''.$$

$\therefore$ N. $47^\circ 53' 6''$ E. is the direction of the wind.

Also solved by A. H. BELL, and the PROPOSER.

PROBLEMS.

16. Yale Senior Prize Problem.---Contributed by H. A. NEWTON, LL. D., Professor of Mathematics, Yale College, New Haven, Connecticut.

The axes of two right cylinders whose bases are circles of 4 and 6 inches radius respectively, intersect at right angles; compute to four decimal places the lengths of the curves of intersection of the two surfaces.

Proposed by SAMUEL HART WRIGHT, M. D., M. A., Ph. D., Penn Yan, Yates county, New York.

A bright star passed my meridian at 7 P. M. The Chronometer soon after ran down and stopped, but I set it again when the same star had a true altitude of $30^\circ = \alpha$. What time was it then, my latitude being $42^\circ 30' \text{ N.} = \lambda$, and the star's Declination $60^\circ \text{ N.} = \delta$?

Solutions to these problems should be received on or before November 1st.

QUERIES AND INFORMATION.

Conducted by J. M. COLAW, Monterey, Va. All contributions to this department should be sent to him.

6. A reply to Professor WHITAKER'S Comment, by H. W. DRAUGHON.

Professor Whitaker's explanation of the difficulty in L. B's solution seems to me illogical. L. B's answer is correct, and does prove if properly substituted.

Professor Whitaker does not discriminate between the sign indicating operation, placed before an expression, and the sign of the *value* of that expression found by solution. For instance, let us take the equation under discussion, $x-4 = +\sqrt{x-4} + 4 \dots (1)$.

Squaring, we readily find, $\sqrt{x-4} = -1$. The $+$ sign before $\sqrt{x-4}$ in (1), merely indicates that the value of $\sqrt{x-4}$, be it positive or negative, is to be added to 4. If Professor Whitaker insists that $\sqrt{x-4}$ cannot have a negative value, he must deny that x can have a negative value in the following equation: $x^2 + 2x = 3 \dots (2)$. To illustrate, let the value of x^2 be required; we readily find $x^2 = 9$ and $x^2 = 1$.

From the first result, we obtain $x = 3$, which does not satisfy (2), but

we have previously found $x = -3$ or 1 . $\therefore$ we know that x cannot be equal to $+3$. This solution is identical with that submitted by L. B. His solution was correct; he simply failed to note the sign of the *value* of $\sqrt{x-4}$. The general rule for preventing ambiguity is, to always find the value of the surd (or surds) of highest degree entering into the original equation, and containing the unknown quantity.

7. **Queries and Answers by JOHN N. LYLE, Westminster College, Fulton, Missouri.**

I. What is a *finite* straight line?

Ans. One that has a beginning and a termination; that is, two ends.

II. What is a *finite* arc of a circle?

Ans. One that is subtended by a chord that is a *finite* straight line.

III. What is a *finite* plane angle?

Ans. One that is measured by a *finite* arc of a circle.

IV. Is the half of any one *given finite* angle however small itself finite?

Ans. Yes, since it is measured by an arc subtended by a chord that is a *finite* straight line. The chord is recognized as finite, since it has two ends.

V. Is the half of any one *given finite* angle however small a variable?

Ans. No, in as much as an affirmative answer involves the contradiction that the same angle may have one value only and more than one at the same time.

VI. Do two straight lines that are perpendicular to the same straight line converge, diverge, or remain equidistant as they are extended?

Ans. According to the Euclidean geometry they neither converge nor diverge but remain the same distance apart.

VII. How is query VI answered in Lobatschewsky's geometry?

MATHEMATICS AT BROOKLYN.

A brief Outline of the First Summer Meeting of the American Mathematical Society, and the Mathematical Papers in Section A of the American Association, by GEORGE BRUCE HALSTED, Press Secretary of Section A.

It was appropriate that the most remarkable and valuable contribution at the meeting of the Mathematical Society should come from our honored President, Dr. Emory McClintock. By his remarkable results in the expression of the roots of algebraic equations he proved that the powers either of his Calculus of Enlargement, or of its genial ceator, were fully adequate to the production of new results in the main line of analysis so decisive as to deserve an immediate recognition even in our text-books.

The paper by Professor Frank Morley of Haverford College was a beautiful application of Elliptic Functions to Cartesian Ovals. It did one good to see our English Colleague handling elliptic functions as an instrument of geometric research.

The paper by Professor Eliakim H. Moore of the University of Chicago was a piece of padding. Of course in an elementary class on the theory of functions, it would be a good exercise to have each of the students write a half-dozen such papers, and in a meeting lacking material such padding, like cotton

in a tooth, holds the opening until the gold comes. The same remarks are true of the paper read by Professor Moore in Section A of the American Association.

Dr. Halsted gave a brief sketch of the popular side of a memoir to be published in full by the Texas Academy of Science.

Professor R. S. Woodward of Columbia College then gave some interesting results in an application of the Theory of Probability, where mathematicians of high rank have made remarkable errors. The work of this charming gentlemen is of permanent value in a delicate and difficult subject.

The paper by Professor Schlegel of Germany was read by Professor Hyde of Cincinnati, and no man in America is better fitted to present an application of Grassmann's *Ausdehnungslehre*, such as this was.

Professor Hyde's old opponent, Dr. Alexander Macfarlane, formerly of the University of Texas but henceforth of New York City, followed with a presentation of the fundamental ideas of his now well-known *Algebra of Physics*, a worthy third and competitor to Rowan Hamilton's Quaternions and Grassmann's *Ausdehnungslehre*.

This paper called forth by far the most interesting discussion of the whole meeting. Professor Fine of Princeton maintained the possibility and desirability of constructing the most important of algebras, that of ordinary Analysis, which neomonic numbers (the so-called pure imaginaries) end and finish, without any use of space.

Dr. Halsted said he had already twice applied that very criticism to Professor Fine, for in his book "the Number-System of Algebra," Professor Fine starts a brave attempt to give what is so desirable, a competent exposition of the work of Dedekind and Georg Cantor on this point. But just when the interest becomes most intense Professor Fine incontinently throws up the sponge, and takes the continuity of his number-system bodily from space. In a very pretty reply Professor Fine plead guilty to the impeachment; said that thoughts of the Princeton Sophomores broke his nerve at the trying moment; but now encouraged by sympathy he would return to the assault in a memoir which he hoped to be able to incorporate into a second edition of his book. Continuing the discussion, Professor Frank Morley brought out the point that however perfectly this ordinary algebra could now be expounded as a subjective mental product of the human mind, yet back of that it was realities independent of the human mind which first incited the mind to picture the world as consisting of natural individuals, and afterward to create those artificial individuals or groups designated as to specific quality by the word *two*. The most primitive number-system has only the concepts *one, two, many*.

Of the mathematical papers presented to section A of the American Association, that by Professor Ormond Stone may be singled out as especially appropriate and valuable.

In it Professor Stone obtains with attractive simplicity and directness results in regard to planetary motion whose deduction heretofore, even by a master in the subject, takes whole pages of difficult reading. Such a paper is a

strong argument against separating Section A into its two components Mathematics and Astronomy.

QUERIES.

1. A Problem by JOHN DOLMAN, Jr., Philadelphia, Pennsylvania.

Required a demonstration of the possibility or impossibility of constructing in Euclidean space, a pseudo-spherical surface or surface of uniform negative curvature.

2. A query by "KENDRICK."

Is it possible psychologically or mathematically to multiply a fraction by a fraction? Why or why not?

EDITORIALS.

In remitting subscriptions, please send by Draft or Money Order, payable to B. F. Finkel, Kidder, Missouri.

It is generally recognized that, as a body, the mathematical teachers of the country need deeper contact with the vast *living* sciences of mathematics, and should be encouraged to buy and read as many standard books as possible. It has been suggested that the MONTHLY could perhaps start reading clubs in such books. We would be pleased to hear from our readers, and if sufficient interest is manifested, we will later, after consulting competent Mathematicians, prepare a course of reading to extend through the next year.

EDITORIAL NOTICE:—We believe no mathematical Journal has ever offered so much valuable matter at \$2.00 a year. It is impossible to give more than 30 pages to the issue at that price, and yet we find our space inadequate to publish *promptly* all the articles which we could secure. Therefore, for the convenience of contributors, and for the purpose of encouraging mathematical investigation, we have made arrangements whereby we will be able to publish in the MONTHLY (in addition to the usual amount of matter) Mathematical papers and articles at \$1.25 per page to be paid by the writer of the article. If Mathematicians encourage this feature, we can extend the number of pages of *such issues as require it* to 40 or 50 pages. Any contributors, having papers in our hands, who wish to encourage the feature and push the publication of the article, will please notify us. Matter paid for will appear along with other matter and there will be no marks to distinguish one from the other. We will furnish any number of MONTHLIES containing any published papers at reduced rates, so that it will be much cheaper than publishing in pamphlet form.

C. A. Laisant, Directeur de l'Intermediaire des Mathematiciens, and A. Vassilief, President of the Physico-mathematical Society of Kasan, have asked Dr. George Bruce Halsted, President of the Texas Academy of Science,